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Inside

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'High-risk enterprise'

Integration in research perceived as daunting task

Review of *Interdisciplinary and Transdisciplinary Landsace Studies: Potential and Limitations,* Barbel Tress, Gunther Tress, Arnold van der Valk and Gary Fry, eds. Delta Series 2 (Wageningen, Netherlands) 2003. 192 Pages. (ISBN 90-807637-1-3).

Reviewed by Kelly Nelson, Interdisciplinary Studies Program, Arizona State University.

My job is to introduce undergraduates at a large state university to the idea and practice of interdisciplinary studies. I teach them what the word 'discipline' means with various prefixes attached (cross-, multi-, inter-, trans-). I talk about the process of integrating knowledge from different domains. And I try to dispel their doubts about having a major with a name that's unfamiliar to most of their parents and peers. I tell them we need interdisciplinarians because we have complex problems that can't be solved by a single discipline alone. Then, I read a book like this and it makes me pause.

This collection of short papers presents practical reflections on interdisciplinary and transdisciplinary research projects. By interdisciplinary, the contributors mean work done by teams of academic researchers from unrelated disciplines. By transdisciplinary, they mean work done by teams of academics from different disciplines collaborating with non-academics. They agree that these types of projects require disciplinarians. This is no place for amateurs, as several of the authors make very clear. Hannes Palang criticizes researchers who dabble in another discipline's methodology in the name of doing interdisciplinary research: "Nobody will take him seriously; claiming that we used inter- or multidisciplinary methods without knowing or using them makes one an amateur. Science needs professionals, not amateurs."[1] Nick Winder states that integrative teams need members who "have been well-educated in a relevant knowledge domain," "have been inducted into a knowledge community," and "have spent enough years contemplating their education to have unpacked and developed it into a mature intellectual position."[2] If you don't have this firm understanding, he warns, "you will be blown like a straw in the wind."[3]

In this case, "interdisciplinary" and "transdisciplinary" serve as adjectives describing a research process and the hoped-for outcomes but not the participants themselves. Yet, by all accounts, when you put a group of disciplinarians in the same room, they don't automatically integrate their knowledge. In summarizing thirty years of interdisciplinary and transdisciplinary environmental research, Monika Wächter details two common near-misses: "disciplinary results are often not integrated but remain isolated from each other" and "one discipline dominates and the others act merely as assisting sciences."[4] Even with the best of intentions and government or grant funding, interdisciplinarity doesn't always emerge from the collective workings of disciplinarians.

One of the threads in this book is the idea that a master integrator is needed to bring real synthesis to these types of projects. The most developed version of this idea is Madeleine van Mansfeld's call for "knowledge brokers." The summary of the sixteen qualifications for this position is daunting. A knowledge broker needs top-notch organizational skills to administer, plan and oversee the inquiry process, as well as versatile communication skills to build bridges between all the parties involved. This person must have relevant disciplinary knowledge along with the ability to reformulate ideas, stimulate others and champion the learning process. This person must

(continued on page 2)

also shepherd the researchers through team building, mediation and conflict resolution. And as if that's not enough, this person also needs to instigate "magical moments!"[5] The need for such a person is echoed in three other chapters that refer to this position as "process manager."[6] Current managers of research projects have enough scientific expertise, according to a survey of 285 transdisciplinary researchers, but are seriously lacking in their ability to resolve conflicts, motivate and organize.[7]

The message that comes through this collection about interdisciplinarity and transdisciplinarity is this: interdisciplinary and transdisciplinary work takes place in the context of problem-focused research; the work is done by teams of disciplinarians, although they are not necessarily equipped with all the necessary skills; and these types of projects are hard to do. The editors and contributors are all in line with the idea that interdisciplinary approaches are called for when taking on complex problems.[8] "It's quite obvious," a contributor states, "that one cannot understand the complex web of interrelations from the viewpoint of a single discipline, nor from a scientific viewpoint alone."[9]

Yet disciplinarians often lack the managerial, leadership and basic communication skills to work together effectively. Writing in *Issues in Integrative Studies*, Rudolf Kötter and Phillip Balsiger remark that scientists, and they note they don't just mean academics in the natural sciences, have a hard time talking and listening to people outside of their own departments. "Assuming that their questions are everyone's questions, they remain oblivious to input from others, especially lay people but also practitioners of other disciplines."[10] An entire section of this book is devoted to discussing the training needs of interdisciplinary research participants. In fact, the University of Basel in Switzerland offers classes on basic communication and managerial skills expressly for scientists and professionals undertaking transdisciplinary work.[11]

There is no giddy rah-rah-ing for the crossing of boundaries here. Interdisciplinary and transdisciplinary research is characterized as a "high risk enterprise"[12] since "achieving integration is difficult and realization often fails."[13] The contributors do not sound eager to enter into integrative research. "To change our research and research methods towards a more interdisciplinary and even transdisciplinary approach," one contributor comments, "is not something we would do just for the fun of it."[14]

While this book is aimed at researchers, it started me thinking about the undergraduates in our interdisciplinary studies program. Can we truthfully tell our students that they are interdisciplinarians, or in the process of becoming interdisciplinarians? At Arizona State University, more than 600 students graduate each year with a Bachelor's of Interdisciplinary Studies degree. The word is on their diplomas but does it apply to them as well? Once they've graduated, in what contexts will they be interdisciplinary? If a key element to being interdisciplinary is the creation of new knowledge by blending (preferably innovatively) distinctive components of two or more different disciplines, then I'd say that few of these graduates will be interdisciplinarians. A small number of undergraduates go on to do serious research. Sure, they live in a world with complex problems but how many of them will be called on, truly called on, to solve such problems? How many will ever be in a position to produce new knowledge?

If interdisciplinarity happens among teams of disciplinarians, can those with only an undergraduate degree be considered disciplinarians? Thomas Benson, in his role as devil's advocate, claimed "a substantial commitment to integrative studies in the undergraduate program will impede the student's development of an essential disciplinary competence."[15] William Newell countered that some professions require the specialized training of a single disciplinary major while many more don't correspond with a single discipline or may even require the thinking skills fostered in interdisciplinary courses.[16] I would add: Do all single discipline undergraduate programs produce disciplinarily competent graduates?

While being a disciplinarian on a team with other disciplinarians is one model for doing interdisciplinary work, there are also individual interdisciplinarians such as the researchers highlighted by Howard Gardner and Veronica Boix-Mansilla's Good Work Project. But here again these people are professional researchers, a role only a few folks with bachelor's degrees will take on. What kind of definition of interdisciplinarity would we need to have so that undergraduates would qualify as interdisciplinarians?

Perhaps it would be more appropriate to call them multidisciplinarians. They are indeed acquainted with at least two disciplines. When the faculty and staff at an interdisciplinary PhD program at the University of Linköping in Sweden feel "more comfortable characterizing themselves as 'multidisciplinary,'"[17] it highlights the difficulty of achieving interdisciplinary synthesis. I think our students are also becoming friends of interdisciplinarity, sympathizers, appreciators, much like taking music classes turns you not into a professional musician but into a better-educated listener. More importantly, these students are hopefully reaping the promises offered by an interdisciplinary education: big picture, innovative thinking; sensitivities and flexibilities in understanding multiple perspectives; and the ability to integrate knowledge from different sources.[18] These are no small things. Still, I have decided to stop telling the students in my introductory courses that they are interdisciplinarians.

As for the book, it has great potential. The contributors have been on the front lines of interdisciplinary and/or transdisciplinary projects. One contributor did a case study of a 350-person regional land-use planning process. Another was involved in designing an interdisciplinary master's program where the students travel to four universities in three different countries as they learn about ecosystem conservation and landscape management. Others have reviewed grant proposals, deciding which interdisciplinary and transdisciplinary projects should be funded, while others have devised frameworks for evaluating research projects that fall outside the silos of traditional disciplines. What we have here is the sleeves-rolled-up straight talk from

European researchers who have been involved in interdisciplinary and transdisciplinary projects.

The problem is the organization of the book. The subtitle sums it up: "potential [singular] and limitations [plural]." The limitations of interdisciplinary and transdisciplinary projects are repeated over and over again. Nearly all of the chapters state that finding a common vocabulary is difficult when working with people from different knowledge areas. Many of the chapters point out that the disciplinary-based criteria for academic promotion get in the way of fostering interdisciplinary research. This repetition becomes tiring, almost deflating. It would be more helpful to constructively build on what has been learned. What can they draw from their experiences? What steps forward have been made? What next steps need to be taken? Answers to these questions do appear in the book yet they are scattered like wildflower seeds, with only some really taking root.

What this book needs is synthesis. As is, it recreates what was said at a two-day seminar in the Netherlands in 2002 where 35 researchers from 11 European countries gathered to discuss their experiences in the area of landscape studies. The conference was organized around five sub-themes and the book dutifully mirrors this set-up with the same five themes, each introduced briefly. This organization doesn't translate well into book form. There is a wealth of hands-on experience with interdisciplinary and transdisciplinary research but the lessons have to be dug out and connected up by the reader. What we have is a multi-disciplinary approach to writing about interdisciplinarity. What would it look like to blur the boundaries of separately authored chapters each by researchers at their own university or research institute? What if each chapter focused on a single limitation, giving examples, responses and best practices in the face of this particular obstacle?

I know: this would mean much more time and work. And each contributor would not have a neat, tidy entry on a C.V. And each point would not be said exactly as each person would say it if writing solo. Marcia Bundy Seabury has recounted in *Issues in Integrative Studies* the many struggles of undertaking collaborative book writing on the topic of interdisciplinarity.[19] As a former editor myself I know it would be a ton of work. But I wanted this book to be more than it is, because it could be. I wanted it to be an integrated project.

As for no longer calling my students interdisciplinarians, I find consolation in thinking that no one watches cap-and-gowned graduates recessing from commencement and says, "That's a smart looking bunch of historians!" or "Look at all those mathematicians!" or "Here come the sociologists!"

Notes

[1] Hannes Palang, "How Does an Elephant Look Like? Some Experiences and Some More Fears about Interdisciplinary Landscape Research," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 57.
[2] Nick Winder, "Successes and Problems When Conducting Interdisciplinary or Transdisciplinary (=Integrative) Research," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 87.
[3] Nick Winder, "Successes and Problems When Conducting Interdisciplinary or Transdisciplinary (=Integrative) Research," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 89. This point has also been made by others. Hugh Petrie, for one, argues "it is only from among the most competent disciplinarians that an interdisciplinary group can draw its members if it hopes for success." ("Do You See What I See? The Epistemology of Interdisciplinary Inquiry," *Educational Researcher*, 1976).
[4] Monika Wächter, "The 'Social-Ecological Research' Program," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 20-21.
[5] Madeleine van Mansfeld, "The Need for Knowledge Brokers," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 38.
[6] Jelleke De Nooy-van Tol, "Needs for Training of Professionals," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 135; Annemarie Groot, "Development of Delta Professionals: The Need for Fundamental Change in Mainstream Landscape Education," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 137; Gary Fry, "Training Needs for Interdisciplinary Research," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 121.
[7] Kirsten Hollaender, "Success Factors in Interdisciplinary and Transdisciplinary Research: Selected Results from the Program Urban Ecology," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 95.
[8] See William H. Newell, "The Case for Interdisciplinary Studies: Response to Professor Benson's Five Arguments," *Issues in Integrative Studies* 2, 1983, 1-19 and William H. Newell, "A Theory of Interdisciplinary Studies," *Issues in Integrative Studies*, 19, 2001, 1-26.
[9] Jelleke De Nooy-van Tol, "Needs for Training of Professionals," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 130.
[10] Rudolf Kötter and Phillipp W. Balsiger, "Interdisciplinary and Transdisciplinarity: A Constant Challenge To The Sciences," *Issues in Integrative Studies*, 17, 1999, 87-120.
[11] Wolfgang Zierhofer, "What Makes a Project a Better Project? Reflections on the Assessment of Transdisciplinary Research," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 170.
[12] Marie Uhrwing, "MISTRA and Interdisciplinarity—Experiences and Expectations," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 29.
[13] Bärbel Tress, Gunther Tress and Gary Fry, "Potential and Limitations of Interdisciplinary and Transdisciplinary Landscape Studies," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 186.
[14] Jelleke De Nooy-van Tol, "Needs for Training of Professionals," in *Interdisciplinary and Transdisciplinary Landscape Studies*, 129.
[15] Thomas C. Benson, "Five Arguments Against Interdisciplinary Studies," *Issues in Integrative Studies*, 1, 1982, 38-48.
[16] William H. Newell, "The Case for Interdisciplinary Studies: Response to Professor Benson's Five Arguments," *Issues in Integrative Studies*, 2, 1983, 1-19.
[17] Julie Thompson Klein, *Interdisciplinarity: History, Theory, and Practice*. Wayne State University Press, 1990, 179.
[18] William H. Newell and William J. Green, "Defining and Teaching Interdisciplinary Studies," in *Interdisciplinarity: Essays from the Literature*. William H. Newell, ed. College Entrance Examination Board, 1998, 32-33; William H. Newell, "Interdisciplinary Curriculum Development," in *Interdisciplinarity: Essays from the Literature*. William H. Newell, ed. College Entrance Examination Board, 1998, 51-53; Julie Thompson Klein, *Interdisciplinarity: History, Theory, and Practice*. Wayne State University Press, 1990, 182-183. See also the AAC&U's *Greater Expectations* report where integrative skills are singled out as a twenty-first century learning need for college students (www.greaterexpectations.org).
[19] Marcia Bundy Seabury, "Venturing into Interdisciplinary Tasks: Common Challenges for Faculty and Students," *Issues in Integrative Studies*, 17, 1999, 71-86.

Learning to Think

Donald offers comparative insight into approaches of 8 disciplines

Review of *Learning to Think: Disciplinary Perspectives*, by Janet Gail Donald (San Francisco: Jossey-Bass, 2002. 352 pages. ISBN 0-7879-1032-5. $39.00.

Reviewed by Diane Lichtenstein, Beloit College, Professor of English and Chair of Interdisciplinary Studies, lichtens@beloit.edu, and student collaborators Sarah Bennett, Brenda Danner, Melissa Dahl, and Whitney Dirks.

I began my reading of *Learning to Think* a little nervously because the jargon as well as the discourse and methodology of educational psychology were unfamiliar. By the time I had finished the first chapter, however, I had gained some significant insight into an important issue at my own academic institution, and, I suspect, at others. This issue, why faculty in different disciplines are more or less resistant to academic assessment, is not necessarily one which Donald explicitly addresses, yet the discussion of how faculty from a number of disciplines validate their work provided me with a fresh approach to the implications of disciplinary differences.

Learning to Think attempts to classify central concepts in eight disciplines (physics, engineering, biology, chemistry, law, education, psychology, and English literature) and to compare those disciplines' learning tasks, thinking processes, and "challenges of instruction," as well as the disciplinary context and perspective of each. Donald would concur with Julie Thompson Klein's observation that "All knowledge is located" (3). Indeed, she bases her multi-year study on the premise that "each discipline or discursive community presents a competing way or ways of giving meaning to the world. Students will therefore learn different ways of organizing and explaining their experience depending on their decision to concentrate on one discipline rather than another" (271).

This volume is not one that develops notions of disciplinary tribes or territories, nor does it analyze the tensions between disciplines and interdisciplinarity. And only rarely does it acknowledge that "knowledge is increasingly interdisciplinary" or that "boundary crossing has become a defining characteristic of the age" (Klein 1). Through most of *Learning to Think*, Donald seems to assume that disciplines organize and structure knowledge and to use a structuralist definition of "discipline" according to Lisa Lattuca's explanation of that term: "Structuralist accounts of disciplinarity define the discipline as a framework for understanding and interpreting information and experience, for judging the validity and adequacy of solutions to problems by defining what is acceptable, appropriate, and/or useful" (24).

On the first page of the Preface, Donald poses four questions that outline the scope of her project: 1) What kind of learning environment do the disciplines provide? 2) What is the knowledge and what are the higher-order thinking processes of the disciplines? 3) What are the best ways to cultivate those processes? 4) How might "post-secondary institutions promote students' intellectual development in all disciplines?"

Donald responds to the last question by identifying three conditions that actually work against such development. The first is, the "quantity of knowledge threatens to overload search and classification processes." The second condition is that "increased educational participation ... means a more heterogeneous student body ... and less time for instructors to give personalized attention to individual learners." The third is, "specialization and decentralization in response to increased amounts of knowledge are accompanied by risks of fragmentation and incoherence" (xii). Donald suggests that each condition "has led to an increased emphasis on content to the detriment of development of thinking processes." She hopes that *Learning to Think* will "help reverse this trend ... by showing how knowledge and thinking processes are associated in various fields of study" (xii).This semester, I am working with four students in a course titled Advanced Seminar in Interdisciplinary Studies. Each of the four will be graduating with her own self-designed, interdisciplinary major. I invited these students to respond to several chapters of *Learning to Think* as undergraduate experts in the lived experience of disciplines and interdisciplinarity. All four agreed that the volume's intended audience is not undergraduates themselves but "...faculty members attempting to explain to students how their discipline is situated and operates in comparison with others" (xiii). And all four raised concerns about the organization of chapters, the clarity of the discourse, and the function of the many tables and charts. What follows are brief evaluations by the students of particular chapters in *Learning to Think*. I specifically asked the students to reflect on the relationship between the chapters' conclusions and their own lived experience in particular disciplinary courses.

Melissa Dahl

During my second year at Beloit College, I created an interdisciplinary major titled Environmental Science and Conservation. This major has allowed me to study the environment and conservation from the perspectives of a variety of disciplines, including biology, geology, economics, politics, philosophy, and sociology. I now have a better understanding of some of the implications and complications involved in environmental conservation.

While reading the discussion on biology in Chapter Four of *Learning to Think*, titled

"Inductive Thinking: Knowledge-Intensive Learning," I noticed processes and structures within the discipline that describe some of my undergraduate education. For example, biology is explained as a "patchwork quilt" with various categories of "factual knowledge" and sometimes "unnecessary memorization" (112, 113). Donald further explains, "Knowledge in biology suffers from a history of categorization that students may see as unconnected facts and labels" (122). I admit that I have encountered and struggled with an abundance of isolated, complicated concepts during my studies in biology. On the other hand, the biological sciences create a challenging learning environment because they are "emergent and ever more diversified" (121).

Donald concludes that in biology, "learning to think involves progress through alternating patterns of deductive and inductive thinking, with the use of inferential skills, particularly changing perspective" (127). She adds that drawing upon previous general knowledge as well as biological experience may determine a student's success in a biology course. Biology, in comparison with other sciences, involves "fuzzier"(127) concepts and modes of explanation; thus it becomes especially important to change perspectives. While Donald's conclusions on biology seem correct in my experience, I believe it is necessary to use various disciplinary perspectives and "multiple modes of explanation" (127) in other disciplines as well. Understanding biology students' thinking processes and challenges, as presented and generalized by Donald, may be useful for professors when designing an interdisciplinary course or studying interdisciplinarity.

Sarah Bennett

Chapter Five in *Learning to Think*, titled "Multifaceted Thinking," covers learning in a social science as exemplified by psychology. The author's conclusions about thinking in psychology seem valid. According to her study, a goal of introductory courses is to disabuse misconceptions of psychology among students by showing how psychology is a science. My experiences as an undergraduate with a self-designed interdisciplinary major relating to language and meaning, for which I have completed introductory, physiological, and social psychology courses, do not perfectly mirror Donald's data in that my introductory psychology course served more to challenge students' preconceptions about human behavior than to address psychology as a discipline. Later courses, however, did place more emphasis on psychology as a science, but not successfully for me, seeing that I remain unconvinced and have consequently drifted away from the field. Based on my own experience, I can see that impressing upon students the importance of creating truth in a given discipline (in psychology: maintaining objectivity, replicability, perceptual accord, etc.) is key to developing critical thinking processes within the discipline, and the author is right to emphasize this point.

I noticed that Donald's investigation demonstrates how psychologists think differently than do those in other disciplines but not that students use different strategies to learn psychology. Despite this conclusion, she makes a strong case that teaching methods should be unique in psychology. Since psychology is not a "neatly organized field" (160) "thinking processes are developed through a series of courses rather than any one course" (148). This calls for a rigorous curriculum stressing verbal precision, ideas of causality, theoretical modeling, analytic reasoning, empirical verification, and skills spotting assumptions and relationships. Donald's discussion of how these roles differ in psychology is probably the most useful, concrete, and concise section of the chapter for interdisciplinarians. She points out, for example, that in psychology representation carries a dual role as a data structure and a process of interrelating structural properties (153). Additionally, students in psychology seem to take a more active role in judging validity in that "professors expect students to verify their conclusions" (157) through multiple tests, perhaps because "in psychology more descriptive and exploratory research than confirming research is done" (156) in comparison with the hard sciences. This chapter highlights some of the distinguishing characteristics of thinking in psychology but muddles them with general theories of good pedagogy in such a way that it is hard to see psychology as a whole.

Brenda Danner

I have a self-designed interdisciplinary major in Science Communication. Courses that apply to my major have primarily been from the Biology, Geology, Education and Communication departments. I have taken two courses from our Education Department: Teaching Elementary Math and Science, and Education of Diverse Learners.

In Chapter Seven of *Learning to Think*, titled "Organizing Instruction and Understanding Learners," Donald (with the help of eleven other professors) discusses the roles of an educator along with numerous difficulties of the education field. Educators need "an overarching attitude of understanding and support towards their students and determination in the face of what may appear at times to be insurmountable odds" (207). Educators can't expect that explaining a new concept will immediately result in successful understanding by learners.

Donald asserts that while educators are "demonstrating scholarship through research and publication " (197), they are simultaneously involved in trying to improve educational practices. Just as in other disciplines, faculty members in an education department must do their own research as well as find ways to apply it. This idea seems fairly obvious as does the conclusion that teachers need to know how to "foster understanding through discussion and collaboration" (213), as well as choose course material that is relevant and pertinent to the issue under discussion. Along with the explanations of what the field of education entails, the chapter includes examples of classroom activities. I think this chapter would be helpful to someone unfamiliar with, but interested in, the general issues and perspectives of this discipline.

Whitney Dirks

Two years ago, I designed my own interdisciplinary major in Renaissance and Theatre Studies. My major consists primarily of theatre, history, and English literature courses, as well as individual classes in Spanish, the history of science, and

(continued on page 6)

interdisciplinary studies. I have concentrated most closely on the Shakespearean stage, examining plays in terms of their theatrical stagecraft, historical context, and literary merit. I examined Chapter Eight of *Learning to Think*, "Criticism and Creativity: Thinking in the Humanities."
Donald concentrates on English literature as "a representative discipline in the humanities," though her definition of "humanities" appears to cover only literature, modern languages, history, philosophy, rhetoric, and classics. The performing and visual arts are not covered by this definition, and her explanation for English literature's representative nature is that it "plays a pivotal role as model to other modern languages in English language universities" (232). Not only does this chapter not represent the humanities as a whole, but in her entire book, Donald dedicates only one chapter to the humanities, whereas she concentrates for three chapters each on the hard sciences (physics, engineering, and chemistry/biology) and the social sciences (psychology, law, and education).

In the section on "The Challenge of Instruction in English Literature," Donald mentions that "passion and aesthetics" are issues for professors (263). Donald also says that students increasingly lack a background in Biblical and classical references, as well as a historical context, making a thorough understanding of a work difficult. I experienced this when, in my high school AP English Literature and Composition class, many of my classmates did not understand Shakespeare's words when studied from a purely literary perspective.

In the final section, Donald recapitulates three conclusions mentioned earlier in this chapter: 1) English literature students need a learning environment that helps them "understand human culture and integrate meaning." 2) They need the higher-order thinking processes of "close reading, traveling along the line of a particular work in order to respond to it, [and] doing justice to the author's intent" (269). 3) "Students need to be helped to find patterns and to search for evidence in order to draw conclusions and formulate their own questions" (270). Throughout this chapter, Donald is studying the "disciplinary perspective" of English literature, but because of her own educational psychology perspective she assumes that English literature can be a single representative discipline of the humanities.

Donald concludes that "the thinking processes are particular to each discipline" (282). She makes this explicit when she compares disciplines in the final chapter, "Learning, Understanding, and Meaning." For example, she states that the "social sciences and humanities share an emphasis on conceptual frameworks or questions rather than on specific concepts, as in the natural sciences" (272). Regarding the use of evidence, she explains: "In more structured disciplines [such as physics], evidence is matched to theory"; in psychology "empirical testing and inter-rater reliability are both used as proof"; in education, one must ask, "Does it work?"; and in English literature, evidence is used to persuade a reader (282). And regarding responses to a question on what they learned, psychology students answered, "different theories can account for the same results with the same validity" which meant that they had "to learn to identify and test all assumptions, evaluate theoretical frameworks carefully, and construct experiments that rigorously test relationships that occur in a complicated process or system." In contrast, English literature students responded that "they had learned to look behind the surface and not take things at face value" (299).

Despite the differences among them, Donald asserts that disciplines provide "systematic scholarly inquiry, and therefore serve as scaffolding for students in the process of exploring different ways of constructing meaning" (292). She also states that there are some general thinking processes: "...identifying the context"; "stating assumptions"; and "changing perspective and confirming results" (283). These can be used to devise "approaches ...that integrate learning experiences" so that students can see the consequences of their learning and actively problem-solve to complete a task, to "define, organize, and resolve a problem" in a group, and "to see a panorama of possibilities" (287).

Surely these observations could apply to interdisciplinary studies as well. At the very end of the volume, Donald admits that it was difficult to "decipher the epistemological principles the disciplines use to define themselves" and that "much fuzziness remains at the edges" (298). She also seems concerned that perhaps disciplines require us to remain within boundaries and "limit perspective and argument" (298). These statements leave the door open to fundamental questions about disciplines and raise two questions I would want to pose to Donald: 1) Are not interdisciplinary theories capable of developing and testing students' intellectual development? 2) Do not students develop intellectually through processes other than those mandated by the disciplines?

I assume that readers who are committed to interdisciplinary studies will interrogate some of Donald's assumptions about disciplines. Despite this, I suggest that *Learning to Think* can provide an increased awareness of disciplines' "ways of knowing" as well as of students' previously-learned disciplinary approaches to knowledge. This volume will promote cross-disciplinary conversations that will in turn prove useful when working with advanced interdisciplinary students as I am this semester, assessing disciplinary or institution-wide curricula, collaborating with a colleague in another discipline, designing an interdisciplinary course, or presenting class material to a discipline-heterogeneous group of students.

Works Cited

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2004 *Issues in Integrative Studies*

The 2004 edition of *Issues in Integrative Studies: An Interdisciplinary Journal* is being prepared for publication. The co-editors are Joan Fiscella of the University of Illinois, Chicago, (jbf@uic.edu) and Francine Navakas of North Central College in Illinois (fgnavakas@noctrl.edu). Authors and their articles will include:

Henrik Bruun and Aino Toppinen, "Knowledge in Science and Innovation—A Review of Three Discourses on the Institutional and Cognitive Foundations of Knowledge Production."

Marcia Bundy Seabury, "Scholarship About Interdisciplinarity: Some Possibilities and Guidelines."

Marc Spooner, "Generating Integration and Complex Understanding: Exploring the Use of Creative Thinking Tools within Interdisciplinary Studies."

Jeremy Smith and William H. Newell, "An Interdisciplinary Approach to Web Design."

Elizabeth Kamarck Minnich, "Reflections on the Wellsprings of Interdisciplinary Studies and Transformative Education," keynote address for the AIS annual conference, October 17, 2004.

The 2004 edition of *Issues in Integrative Studies* is expected to be ready for mailing in June 2005. All AIS members who held active memberships in 2004 will automatically receive copies of the new edition as part of their membership (regular and student members each receive one copy; institutional members receive two copies each).

New members in 2005 and others may pre-order copies of the 2004 edition by completing this order form and mailing it with a check or money order for $20 per copy, payable (in U.S. dollars) to Association for Integrative Studies, School of Interdisciplinary Studies, Miami University, Oxford, OH 45056. Federal ID # 31-0965196.

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HTA issues call for papers

The Humanities and Technology Association is inviting submissions of abstracts, works-in-progress and papers for review for its annual conference October 6-8, 2005, in Salt Lake City, Utah.

The theme is: "A Dialogue on Technology and Human Life: Finding Meaning and Cultivating Humanity in a 21st Century Technological World." Contacts are: Dr. Wayne B. Hanewicz, Utah Valley State College, Orem, Utah, hanewiwa@uvsc.edu, 801-863-6343, and Katrina Williams, kxwilliams@gmail.com, 248- 802-7991.

The 2005 HTA Conference is designed to encourage and cultivate continuing inquiry and dialogue on the relationship between technology and humanity. Topic areas will include the Human Experience of Technology, The Human Understanding of Technology, and The Social Cultural Impacts of Technology. Cross-disciplinary submissions are encouraged.

The conference will provide opportunities in three formats: traditional panel papers no longer than 15 pages; small theme-based discussion group papers no longer than 5-8 papers; and student papers no longer than 10-12 pages.

All panel, discussion group, and student abstracts should be submitted in Microsoft Word (.doc) or Rich Text Format (.rtf) file attachments. Abstracts should not exceed 300 words. Submissions should include the names of the author or authors and their affiliation, titles including 3 to 5 key words that relate to the topic, appropriate tracks, including "panel," "discussion group," or student paper designations, and email addresses, phone and fax numbers for all authors.

All submissions for review must be received electronically by April 30, 2005 by sending them to HTA@uvsc.edu. Submission deadline for final papers is June 30, 2005.

Invitation for Proposals for AIS/AGLS Joint National Conference

The Association for Integrative Studies and the Association for General and Liberal Studies will partner in October 2005 to bring together educators from around the globe to exchange ideas on current challenges, opportunities and best practices in integrated learning. The AIS and AGLS Joint National Conference – "Integrations: Liberal Learning in a Diverse World" – will be hosted by New Century College, George Mason University, Fairfax, Virginia, October 6-9, 2005. It will be the AIS 27th annual conference and the AGLS 45th annual conference.

The deadline to submit proposals for the 2005 joint conference is April 30, 2005. A copy of the Proposal Submission Form can be accessed online via the conference website, www.ncc.gmu.edu/integrations/conference.html.

We are encouraging submission of proposals on topics such as: trends in international, multicultural, and interdisciplinary education; integration of curricular and co-curricular learning; service-learning and experiential learning possibilities in interdisciplinary settings; innovative student leadership programs; and mechanisms for assessing integrative learning in diverse student populations.

More topic suggestions for papers/workshops/panels/poster presentations include: **Values and Character Development** (civic engagement, academic integrity, diversity, living/learning programs), **International Education** (integrative learning in study-abroad programs, integrative general and liberal studies outside the U.S., international internships and international student concerns on American campuses), **Partners for Learning Off-Campus** (community-based research, service-learning, campus-community partnerships), **Changing Student Demographics** (integrating interdisciplinary challenges with changing student demographics such as traditional and nontraditional student distinctions, multicultural issues, community college needs, first-year learning programs), **Learning in the Next Generation** (cultivating student leaders, mentorship programs, interdisciplinary curriculum support for leadership studies, and **Assessment and Change** (changing ways to assess interdisciplinary learning in diverse student populations).

To submit a proposal, email the Proposal Submission Form by April 30, 2005, to AIS/AGLS Conference Committee at: ncconf@gmu.edu or fax it to Janette Muir, 703-993-1439. (Email submissions are preferred, but faxed or mailed submissions will also be accepted).

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